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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/714,193	11/17/2000	Kouichi Ichimura	199858US2SRD	5422

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EXAMINER
KAO, CHIH CHENG G

ART UNIT	PAPER NUMBER
2882	

DATE MAILED: 01/30/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/714,193	Applicant(s) ICHIMURA ET AL.	
	Examiner Chih-Cheng Glen Kao	Art Unit 2882	

-- The MAILING DATE of this communication appears on the cover sh et with th correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____ .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-18* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-18* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *17 November 2000* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2 .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

1. Claims 1-5, 11-14, and 16-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Barnes (US Patent 3754988) in view of Ho (US Patent 6298180) and Vitanov et al. ("Properties of stimulate Raman adiabatic passage with intermediate-level detuning").

Barnes discloses a quantum processor and method (Title, col. 1, lines 5-20) comprising physical systems as ions (col. 1, lines 5-12) held in a solid substance (Fig. 1) with a plurality of physical system groups having transition frequencies in a given range (inherent) and with energy levels (Fig. 1, "Memory elements") for bits (Fig. 3) with a light source for irradiating with two lights, optical system, two kinds of light for scanning (Fig. 1, "f1" and "f2"), and photodetectors for reading-out the quantum states (Fig. 1, "Detectors").

However, Barnes does not disclose three energy levels with an initial state, a resonator around the system as an acousto-optic device to control frequency, and an electro-optic device to generate a light pulse train.

Ho teaches a resonator around the system (col. 18, lines 1-4) as an acousto-optic device to control frequency and an electro-optic device to generate a light pulse train (Fig. 6A, "CW PWR"). Vitanov et al. teaches the three energy levels with an initial state (Fig. 1).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to have the resonator of Ho with the device and method of Barnes, since one would be motivated to use the resonator to have selectivity in the frequency control for the two kinds of light as implied from Ho (col. 18, lines 1-3).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to have the three energy levels with an initial state of Vitanov et al. with the method and device of Barnes, since one would be motivated to use these energy levels in adiabatic passage for selective and efficient population transfer of information as implied from Vitanov et al. (Page 394, col. 1, lines 1-10).

2. Claims 6, 7, 9, and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Barnes in view of Ho and Vitanov et al. as applied to claim 1 above, and further in view of Cirac et al. ("Quantum Computations with Cold Trapped Ions").

Barnes in view of Ho and Vitanov et al. suggests a method as recited above.

However, Barnes does not disclose energy levels set to $|0\rangle$, $|1\rangle$, and $|e\rangle$ from lowest to highest energy for a controlled-not operation and where transitions are coupled with light for preprocessing with a central transition frequency and $\Delta\, \nu_{Bw}$ smaller than half of $\Delta\, \nu_{01inhome}$ from $\Delta\, \nu_{01center}$ along with the controlled-not operation with a one-quantum bit operation.

Cirac et al. teaches energy levels set to $|0\rangle$, $|1\rangle$, and $|e\rangle$ from lowest to highest energy for a controlled-not operation (Page 4093, col. 1, 1st paragraph) and where transitions are coupled with light for preprocessing (top of Page 4093) with a central transition frequency (Page 4092, end of col. 1, and beginning of col. 2) and $\Delta\, \nu_{Bw}$ smaller than half of $\Delta\, \nu_{01inhome}$ from $\Delta\, \nu_{01center}$

(inherent) along with the controlled-not operation with a one-quantum bit operation (Page 4093, col. 1, last paragraph).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to have the energy levels and transitions of Cirac et al. with the suggested method of Banes in view of Ho and Vitanov et al., since one would be motivated to use these transitions to control a bit gate in the quantum computer as implied from Cirac et al. (Page 4092, col. 2, last paragraph).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to controlled-not operations and bit operations of Cirac et al. with the suggested method of Banes in view of Ho and Vitanov et al., since one would be motivated to use these operations for quantum computers which solve problems efficiently and better than classical Turing machines as implied from Cirac et al. (Page 4091, col. 1, 1st paragraph).

3. Claims 8 and 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Barnes in view of Ho and Vitanov et al. as applied to claims 1 and 14 above, and further in view of Oda (US Patent 5371388).

Barnes in view of Ho and Vitanov et al. suggests a device as recited above.

However, Barnes does not disclose an electromagnet to control the magnetic field.

Oda teaches an electromagnet to control the magnetic field (col. 2, lines 44-60).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to have the electromagnet of Oda with the suggested device of Banes in view of Ho and Vitanov et al., since one would be motivated to use the electromagnet to

selectively modulate the frequency needed to control a physical system as implied from Oda (col. 2, lines 44-60).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Chih-Cheng Glen Kao whose telephone number is (703) 605-5298. The examiner can normally be reached on M - Th (8 am to 5 pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert Kim can be reached on (703) 305-3492. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9318 for regular communications and 703-872-9319 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

gk
January 27, 2003

SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800